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MAN-MADE NOMINAL WIND ACTION AREA

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In some areas where snow studies are being carried on, achieving a representative area for collecting and recording snowfall data is extremely difficult. The difficulty arises when the data are collected at or above timberline where high winds cause heavy drifting during snowfall periods. The Berthoud Pass Snow Study area is one of these difficult areas.

For the past several years snowfall records have been collected in what is known as the Q-12 Park. This area is in a thinly timbered zone and appears to be the most representative site that can be found within an accessible distance and at the elevation desired. This area is known to be a nominal wind action area due to a thin timber stand. The travel distance amounts to about ½ mile each way. Quite often data are not collected on time or are neglected throughout a night-time storm period, and it is difficult to maintain automatic instrumentation in proper working order. An attempt therefore was made to construct a nominal wind action area near the quarters used by the observers.

See photos. A somewhat circular design was selected. Posts about 20' long were set 3' in the ground and spaced 6' apart. Standard snow fencing was then installed on the posts. The lowest fence was installed leaving a 6' gap between the ground and the bottom edge of the fence. It was thought that perhaps this gap would induce scouring under the fence and data collection table so that shoveling out would be kept to a minimum. As was expected, shoveling was not necessary, but next year

it is planned to reduce the ground-to-snow fence gap by at least half. It is felt that the 6' gap was causing some problems in snowfall catch.

A second section of fence was installed above the first. This fence overlapped the first by about 6".

This installation gave about 7'6" of effective snow fence height. The collection table was approximately 7' below the top of the fence while the 775-B precipitation gauge and Tipping Bucket gauge orifices were about 3' below the top of the fence.

An entrance gap of about 3' wide was left on the S.E. corner of the installation.

Wind velocities of 40 mph are not uncommon in this area during storm periods.

As the first few storms were monitored comparisons were made with the data collected from the Q-12 Park area. There appeared to be more deviation than could be tolerated. It was thought that the difference in readings between the sites could be reduced by additional fence. Therefore, additional fence was installed overlapping the first and thus cutting down the air-to-slat factor by half. The fence was added so that the center half of the initial installation was covered. Thus about 2' of the top and bottom of the original installation was left unaltered as far as air-to-slat space is concerned.

Data collection comparison between the man-made installation and the Q-12 Park seemed to approach a more acceptable level but it is felt that further improvements are necessary to combat the strong influence of the high wind velocities involved in this area.

For instance:

1. Reduce ground to fence gap by at least three feet.
2. Additional overlapping to reduce air to slat ratio.
3. Reduction in size of personnel gate area.
4. More positive centering of the gauges within the center of the plot.

To cope with the heavy gusting that occurs in this area, heavy external bracing was installed. This installation was mounted on fresh fill material and it was felt that the whole installation might be blown down without the internal bracing. If an installation is made on undistrubed earth, the internal bracing could probably be eliminated.

Comparison of Data - 1)

Month	Snow Fence (Station) 775-B		Q-12 Park 775-B
November 3	.05		.12
4	.25		.34
11	.23		.42
12	.25		.25
18	.30		.46
	1.08	Difference .51	1.59
December 9	.15		.13
10	.18		.18
17	.08		.12
22	.29		.36
26	.10		.10
27	.14		.24
30	.15		.16
31	.12		.14
	1.21	Difference .22	1.43

Month	Snow Fence (Station) 775-B		Q-12 Park 775-B
January 7	.33		.55
14	.14		.21
19	.35		.35
20	.40		.42
21	.23		.21
	1.45	Difference .29	1.74
February 17	.30		.32
18	.21		.35
24	.25		.40
	.76	Difference .31	1.07

Moved 775-B gauge to more central location within fenced area.

Month	Snow Fence (Station) 775-B		Q-12 Park 775-B
March 2	.46		.49
4	.21		.20
10	.46		.49
11	.14		.17
18	.06		.06
24	.17		.21
	1.50	Difference .12	1.62
April 6	.25		.38
7	.27		.27
8	.51		.70
9	.30		.29
11	.20		.18
	1.53	Difference .29	1.82

1) Data used in precipitation comparison charts are not complete for all precipitation for each whole month but were more or less picked at random leaving out, however, many figures around the .05 to .10 bracket.

As can be seen by comparison of figures, the total precipitation for each month was greater in the Q-12 Park 775-B than in the snow fence (station) gauge.

As can be seen by comparing the difference in figures, March began to close the difference gap considerably.

It is felt that this took place for two reasons; both can be corrected and are installation problems:

1. During the latter part of February, the 775-B was moved to a more central location within the fenced diameter.
2. The 6' ground to snowfence gap was reduced by snow accumulation. (See photo taken on April 10, 1962, Maximum Accumulation Stake Reading.)

In any event, with further inexpensive modification, it is felt that an acceptable method of recording snowfall can be man-made by the use of this type of installation. This is called the man-made nominal wind action area.

Figure 1

Shows general overall installation of the snow fence to make a man-made nominal wind action area.

Note the difference in snow depth under the fence at the right of the photo and at the left of the photo. The left side of the photo is northerly and the edge of the installation is on the edge of the fill which drops off for about 10 ft. The northern high speed winds come up the fill bank and under the fence causing much scouring.

Figure 2

Location of the Tipping Bucket, the Friez 775-B and the 8" can. All of this instrumentation is on a large table.

Figure 3

New snow stakes and settlement gauge.

FIGURE 1

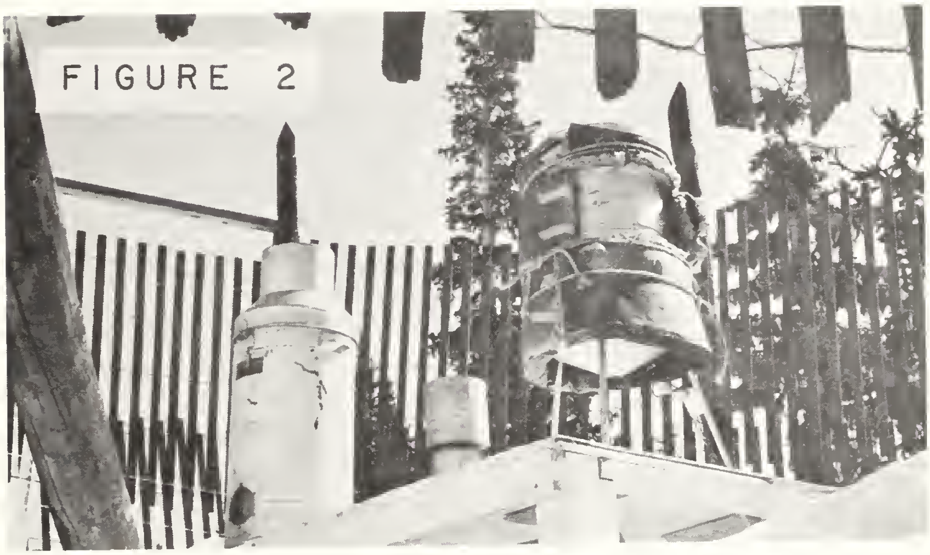

FIGURE 2

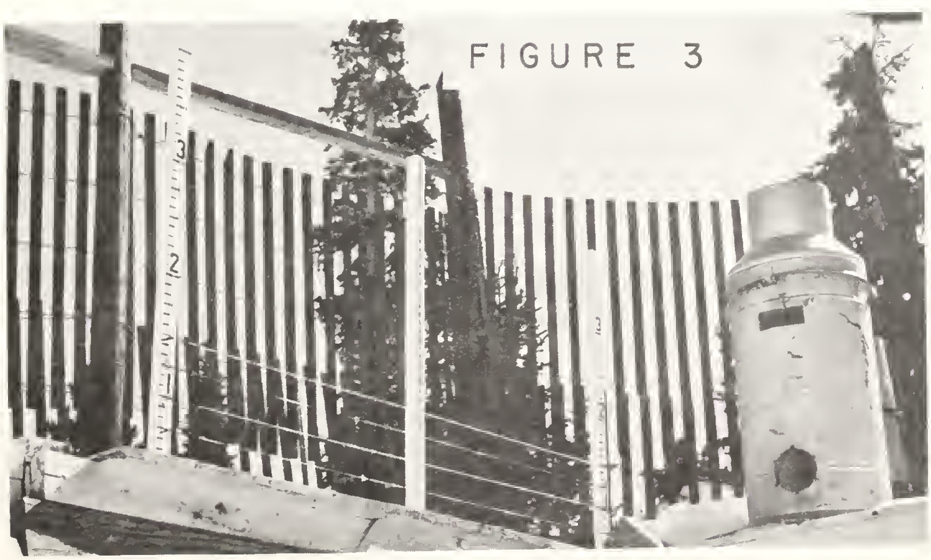

FIGURE 3